

## **Summary of Recent MODIS events and activities up through early August 2005**

### Instrument Status.

The Terra and Aqua MODIS instruments continue to operate nominally from a scientific perspective.

Over the past month the principal subject of discussion has been the cause and consequences resulting from the failure of another one out of four of the 10W (one failed early in the Aqua mission) lamps on the Spectral Radiometric Calibration Assembly (SRCA) within the Aqua MODIS instrument. This has resulted as part of an Aqua Failure Review being conducted by HQ and to which MODIS (Salomonson and Xiong) will contribute in a meeting at NASA Headquarters on August 23. The failure-review action has resulted in several studies and meetings at Goddard to which Jack Xiong and the MODIS Characterization Support Team (MCST) has provided input.

Essentially the loss of this 10W lamp limits the magnitude of the radiances from the SRCA that can be used for radiometric calibration to a 20W level (two lamps combined) whereas 30W had been the upper limit used in the past. From the science perspective it is felt that albeit the loss of the lamp limits somewhat the radiometric use of the SRCA, it doesn't represent a failure that significantly affects any science being done with the Aqua MODIS. This conclusion is based on the fact that the SRCA has been useful for checking the spatial, spectral, and radiometric performance of MODIS. However, as observed by the SRCA, MODIS has consistently been able to meet spatial and spectral, as well as radiometric, specifications over the entire instrument life-span. With respect to change in spatial (band and focal plane registration) and spectral (shifts in the center-wavelength of bands) performance there is no reason to think this will change. As a result we are concluding that the loss of 10W lamp on the SRCA does not create a critical or essential loss for characterizing the MODIS performance. In addition, as most everyone knows there are other, more reliable and essential ways to check the instrument radiometric performance; e.g., the solar diffuser, the moon, deep space, the blackbody, vicarious sources, etc.

### Data Processing Status

The Goddard DAAC continues to very good performance in producing Level 1 products and putting products into their archive. At present the GFSC DAAC is staying a day or less behind the "leading edge" in forward processing of MODIS data. They are reprocessing Level 1 data for both the Terra and Aqua instruments as part of the "Collection 5" effort. Overall they are sustaining for both forward and reprocessing of MODIS data a rate of over 5X.

With regard to the delivery of MODIS data from the Goddard DAAC, they are delivering MODIS data at rates near 1.6 Terrabytes per day and 25,000 granules per day over the last month.

In the processing of Level 2 and above products, the MODIS Adaptive Processing System (MODAPS) is principally focused on preparing for "Collection 5" reprocessing for MODIS atmospheres and land products. The present plan is for the Atmospheres reprocessing to begin in September and finish in the spring of 2006. The reprocessing of atmospheres products is based on some significant improvements as compared to the Collection 4 and will cover the time period from Terra "first light" (February 2000) forward to the present. An excellent description of the atmospheres "Collection 5" changes is given at: [http://modis-atmos.gsfc.nasa.gov/products\\_C005update.html](http://modis-atmos.gsfc.nasa.gov/products_C005update.html). Similarly and relative to the Atmosphere effort, the reprocessing of Land products, assuming successful tests of the processing performance, will begin in the December 2005/January 2006 time frame and conclude in the fall of 2007.

There are changes occurring in the processing of MODIS Sea Surface Temperature (SST) data. The MODAPS has started reprocessing Terra SST beginning with the January 1, 2001 data at about a 22X rate and projects completion of the Terra SST reprocessing in March of 2006. They will continue reprocessing of MODIS SST until the Ocean Color Data Processing System (OCDPS) at Goddard assumes that responsibility for Terra early in 2006. Aqua reprocessing of SST will be performed by the OCDPS starting in November 2005.

The OCDPS is continuing to evaluate and process Aqua MODIS ocean color data. Recently a complete reprocessing of Aqua MODIS data has been completed successfully through level-3 and all the products are available for distribution via the oceancolor web. The description of the changes implemented for this reprocessing can be found at: <http://oceancolor.gsfc.nasa.gov/REPROCESSING/Aqua/R1.1/>. Furthermore, NASA Headquarters directed that, effective immediately (in late June), all ocean color product suites were to be deleted from the Goddard DAAC because the products are viewed as outdated and shouldn't be available. The reprocessing of Terra MODIS ocean color observations is to-be-determined after further study.

#### Science/Applications-related Publications

179 out of a total of 833 publications involving MODIS are listed in the ISI "Web of Science" for 2005. The growth in the use of MODIS as evidenced in the refereed literature is quite rapid. Additionally, in the "Web of Science Proceedings" there are a total of 772 publications listed of which 207 have appeared in 2005--another indication of the growth in the use of MODIS observations as reflected in proceedings articles.

The following list of papers come predominantly from the ISI "Web of Science" listings of refereed papers for only the period from June 2005 to the present (as of August 15, 2005). Not only do these listing (probably not complete) show a wide variety of results coming from MODIS, but also a good diversity of institutions involved and a wide variety of journals. a "CNTR + click to follow the link" procedure applied to the title of the article may work to see the abstract. Otherwise the reference is there from which to find the article.

Breon FM, Doutriaux-Boucher M [A comparison of cloud droplet radii measured from space](#)  
IEEE TRANSACTIONS ON GEOSCIENCE AND REMOTE SENSING 43 (8): 1796-1805 AUG  
2005

Sun JQ, Xiong XXJ, Barnes WL [MODIS solar diffuser stability monitor sun view modeling](#)  
IEEE TRANSACTIONS ON GEOSCIENCE AND REMOTE SENSING 43 (8): 1845-1854 AUG  
2005

Shabanov NV, Huang D, Yang WZ, et al. [Analysis and optimization of the MODIS leaf area index algorithm retrievals over broadleaf forests](#) IEEE TRANSACTIONS ON GEOSCIENCE AND REMOTE SENSING 43 (8): 1855-1865 AUG 2005

Peres LF, DaCamara CC [Emissivity maps to retrieve land-surface temperature from MSG/SEVIRI](#)  
IEEE TRANSACTIONS ON GEOSCIENCE AND REMOTE SENSING 43 (8): 1834-1844 AUG  
2005

Ramanathan V, Ramana MV  
[Persistent, widespread, and strongly absorbing haze over the Himalayan foothills and the Indo-Gangetic Plains](#)  
PURE AND APPLIED GEOPHYSICS 162 (8-9): 1609-1626 AUG 2005

Wang MH, Shi W [Estimation of ocean contribution at the MODIS near-infrared wavelengths along the east coast of the US: Two case studies](#) GEOPHYSICAL RESEARCH LETTERS 32 (13): Art. No. L13606  
JUL 13 2005

Cornet C, Buriez JC, Riedi J, et al. [Case study of inhomogeneous cloud parameter retrieval from MODIS data](#) GEOPHYSICAL RESEARCH LETTERS 32 (13): Art. No. L13807 JUL 6 2005

Balch WM, Gordon HR, Bowler BC, et al.  
[Calcium carbonate measurements in the surface global ocean based on Moderate-Resolution Imaging Spectroradiometer data](#) JOURNAL OF GEOPHYSICAL RESEARCH-OCEANS 110 (C7): Art. No. C07001 JUL 2 2005

Jin Y, Roy DP [Fire-induced albedo change and its radiative forcing at the surface in northern Australia](#)  
GEOPHYSICAL RESEARCH LETTERS 32 (13): Art. No. L13401 JUL 1 2005

Rothery DA, Coppola D, Saunders C [Analysis of volcanic activity patterns using MODIS thermal alerts](#)  
BULLETIN OF VOLCANOLOGY 67 (6): 539-556 JUL 2005

Sakamoto T, Yokozawa M, Toritani H, et al.  
[A crop phenology detection method using time-series MODIS data](#) REMOTE SENSING OF ENVIRONMENT 96 (3-4): 366-374 JUN 30 2005

Wang Q, Tenhunen J, Dinh NQ, et al.  
[Evaluation of seasonal variation of MODIS derived leaf area index at two European deciduous broadleaf forest sites](#) REMOTE SENSING OF ENVIRONMENT 96 (3-4): 475-484 JUN 30 2005

Anderson LO, Shimabukuro YE, Arai E  
[Multitemporal fraction images derived from Terra MODIS data for analysing land cover change over the Amazon region](#) INTERNATIONAL JOURNAL OF REMOTE SENSING 26 (11): 2251-2257 JUN 10 2005

Barbini R, Colao F, Fantoni R, et al.  
[Comparison of SeaWiFS, MODIS-Terra and MODIS-Aqua in the Southern Ocean](#)  
INTERNATIONAL JOURNAL OF REMOTE SENSING 26 (11): 2471-2478 JUN 10 2005

- Fensholt R, Sandholt I  
[Evaluation of MODIS and NOAA AVHRR vegetation indices with in situ measurements in a semi-arid environment](#) INTERNATIONAL JOURNAL OF REMOTE SENSING 26 (12): 2561-2594 JUN 20 2005
- White MA, Shaw JD, Ramsey RD  
[Accuracy assessment of the vegetation continuous field tree cover product using 3954 ground plots in the south-western USA](#) INTERNATIONAL JOURNAL OF REMOTE SENSING 26 (12): 2699-2704 JUN 20 2005
- Roskovensky JK, Liou KN [Differentiating airborne dust from cirrus clouds using MODIS data](#)  
 GEOPHYSICAL RESEARCH LETTERS 32 (12): Art. No. L12809 JUN 22 2005
- Martel MC, Margolis HA, Coursolle C, et al. [Decreasing photosynthesis at different spatial scales during the late growing season on a boreal cutover](#) TREE PHYSIOLOGY 25 (6): 689-699 JUN 2005
- Zaitchik BF, Evans J, Smith RB [MODIS-derived boundary conditions for a mesoscale climate model: Application to irrigated agriculture in the euphrates basin](#) MONTHLY WEATHER REVIEW 133 (6): 1727-1743 JUN 2005
- Linderman M, Rowhani P, Benz D, et al. [Land-cover change and vegetation dynamics across Africa](#)  
 JOURNAL OF GEOPHYSICAL RESEARCH-ATMOSPHERES 110 (D12): Art. No. D12104 JUN 17 2005
- Laepple T, Schultz MG, Lamarque JF, et al. [Improved albedo formulation for chemistry transport models based on satellite observations and assimilated snow data and its impact on tropospheric photochemistry](#)  
 JOURNAL OF GEOPHYSICAL RESEARCH-ATMOSPHERES 110 (D11): Art. No. D11308 JUN 10 2005
- Zhang XY, Friedl MA, Schaaf CB, et al. [Monitoring the response of vegetation phenology to precipitation in Africa by coupling MODIS and TRMM instruments](#) JOURNAL OF GEOPHYSICAL RESEARCH-ATMOSPHERES 110 (D12): Art. No. D12103 JUN 17 2005
- Wang KC, Wan ZM, Wang PC, et al. [Estimation of surface long wave radiation and broadband emissivity using Moderate Resolution Imaging Spectroradiometer \(MODIS\) land surface temperature/emissivity products](#) JOURNAL OF GEOPHYSICAL RESEARCH-ATMOSPHERES 110 (D11): Art. No. D11109 JUN 14 2005
- Liang XZ, Xu M, Gao W, et al. [Development of land surface albedo parameterization based on Moderate Resolution Imaging Spectroradiometer \(MODIS\) data](#) JOURNAL OF GEOPHYSICAL RESEARCH-ATMOSPHERES 110 (D11): Art. No. D11107 JUN 7 2005
- Tralli DM, Blom RG, Zlotnicki V, et al. [Satellite remote sensing of earthquake, volcano, flood, landslide and coastal inundation hazards](#) ISPRS JOURNAL OF PHOTOGRAMMETRY AND REMOTE SENSING 59 (4): 185-198 JUN 2005
- Xiao XM, Zhang QY, Hollinger D, et al.  
[Modeling gross primary production of an evergreen needleleaf forest using modis and climate data](#)  
 ECOLOGICAL APPLICATIONS 15 (3): 954-969 JUN 2005
- Patrick MR, Smellie JL, Harris AJL, et al. [First recorded eruption of Mount Belinda volcano \(Montagu Island\), South Sandwich Islands](#) BULLETIN OF VOLCANOLOGY 67 (5): 415-422 JUN 2005

In addition Yoram Kaufman, Ian Koren and Colleagues have recently published two intriguing articles that are not yet in the ISI Web of Science describing the effects of aerosols on cloud extent and pressure. See:

Koren, I., Kaufman, Y. J., Rosenfeld, D., Remer, L.A., and Rudich, Y. (2005). [Aerosol invigoration and restructuring of Atlantic convective clouds](#). Geophysical Research Letters. 32, L14828, doi: 10.1029/2005GL023187.

Kaufman, Y.J., Koren, I., Remer, L.A., Rosenfeld, D., Rudich, Y. (2005). [The effect of smoke, dust, and pollution aerosol on shallow cloud development over the Atlantic Ocean](#). Proc. Natl. Acad. Sci. USA, 10.1073/pnas.0505191102

The papers suggest that increasing aerosols, acting as cloud condensation nuclei, alter cloud microphysical properties to create more numerous but smaller cloud droplets. These smaller droplets delay the onset of precipitation, extending cloud lifetime and cloud coverage. In deep convection, the smaller droplets also delay precipitation until the cloud develops to higher than expected levels. The result is deeper convective clouds with greater anvil production. The combined results of these two papers suggest that aerosols may have a significant effect, not only on the radiative balance of the Earth, but also on the Earth's hydrological cycle and the general circulation of the atmosphere.